



ARSET

Applied Remote Sensing Training

<http://arset.gsfc.nasa.gov>

Creating and Using Normalized Difference Vegetation Index (NDVI) from Satellite Imagery

Instructors: Cindy Schmidt and Amber McCullum

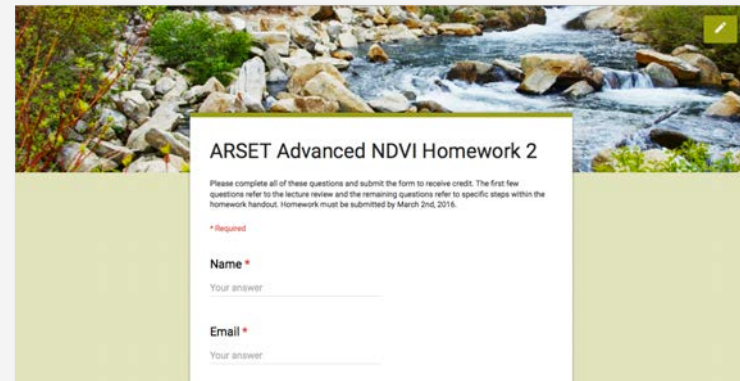
Week 2

Course Structure

- One lecture per week – every Wednesday from February 10 to March 2 at 12:00-1:00pm EST (-05:00 UTC)
 - Lectures
 - In-class exercise
 - Q&A
 - Homework exercises
- Webinar recordings, PowerPoint presentations, in-class exercises, and homework assignments can be found after each session at:
 - <http://arset.gsfc.nasa.gov/ecoforecasting/webinars/advanced-webinar-creating-and-using-normalized-difference-vegetation-index>
- Q&A: Following each lecture and/or by email (cynthia.l.schmidt@nasa.gov) or (amberjean.mccullum@nasa.gov)

Homework and Certificates

- Homework
 - Hands-on exercise each week
 - Answers must be submitted via Google Form
- Certificate of Completion:
 - Attend all 4 webinars
 - Complete all 4 homework assignments by the deadline (access from ARSET website)
 - Week 2 Deadline: Wednesday March 2nd
 - You will receive certificates approximately 2 months after the completion of the course from: marines.martins@ssaihq.com



ARSET Advanced NDVI Homework 2

Please complete all of these questions and submit the form to receive credit. The first few questions refer to the lecture review and the remaining questions refer to specific steps within the homework handout. Homework must be submitted by March 2nd, 2016.

* Required

Name *

Your answer

Email *

Your answer

Accessing Course Materials

- <http://arset.gsfc.nasa.gov/ecoforecasting/webinars/advanced-webinar-creating-and-using-normalized-difference-vegetation-index>

Earth Sciences Division Applied Sciences ASP Water Resources

NASA ARSET Applied Remote Sensing Training

DISASTERS ECO FORECASTING HEALTH & AIR QUALITY WATER RESOURCES

Eco Forecasting

- Eco Webinars
- Eco Personnel

Fundamentals of Remote Sensing

- On-Demand Training on Fundamentals of Remote Sensing

Upcoming Training

Ecoforecasting Advanced Webinar: Creating and Using Normalized Difference Vegetation Index (NDVI) from Satellite Imagery 02/10/2016 to 03/02/2016

Advanced Webinar: Creating and Using Normalized Difference Vegetation Index (NDVI) from Satellite Imagery 02/10/2016 to 03/02/2016

October 2015 NDVI

Wednesdays 12:00PM-1:00PM EST (UTC -05:00)

February 10, February 17, February 24, March 2

Registration closes on February 8, 2016

Course Description: In this advanced webinar, participants will learn how to acquire, use, and derive

Course Materials

Week	Date	Title	Presentation	Data and Exercise	Recording	Homework
1	February 10, 2016	Introduction to NDVI and QGIS	Week 1 Presentation Week 1 Presentation (Spanish)	Week 1 Data Week 1 Exercise	View Week 1 Recording	Homework 1 Exercise Homework 1 Submission
2	February 17, 2016	Deriving NDVI from Landsat	Week 2 Presentation Week 2 Presentation (Spanish)	Week 2 Data Week 2 Exercise	View Week 2 Recording	Homework 2 Exercise Homework 2 Submission
3	February 24, 2016	MODIS NDVI Time Series	Week 3 Presentation Week 3 Presentation (Spanish)	Week 3 Data Week 3 Exercise	View Week 3 Recording	Homework 3 Exercise Homework 3 Submission
4	March 2, 2016	MODIS NDVI Anomalies	Week 4 Presentation Week 4 Presentation (Spanish)	Week 4 Data Week 4 Exercise	View Week 4 Recording	Homework 4 Exercise Homework 4 Submission

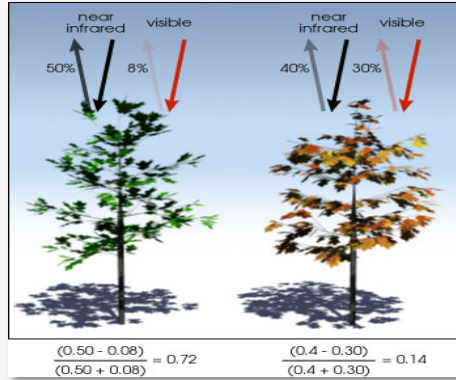
*Please note that you must register to view all recordings. This includes the requirement to re-register for each separate recording for live webinar participants.

Course materials are provided here using each specified link and will be active after each week

Course Outline

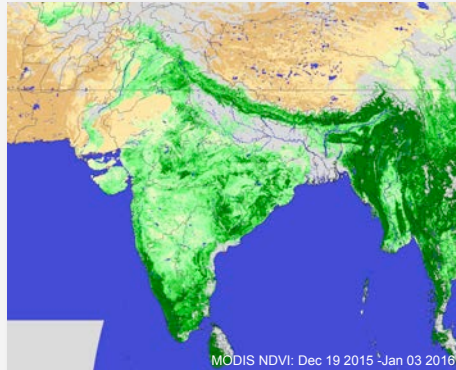
Week 1

Overview of NDVI and QGIS



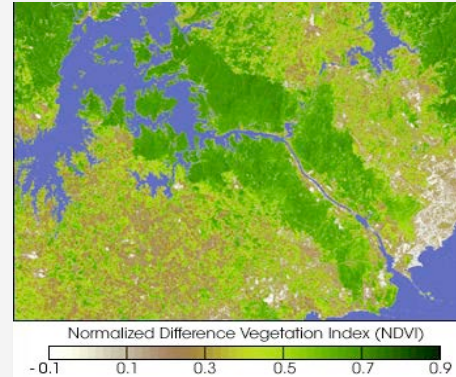
Week 3

MODIS NDVI Time Series



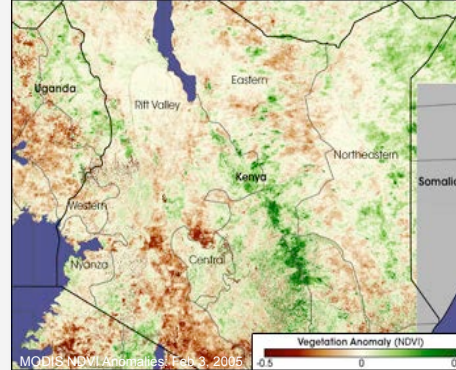
Week 2

NDVI with Landsat



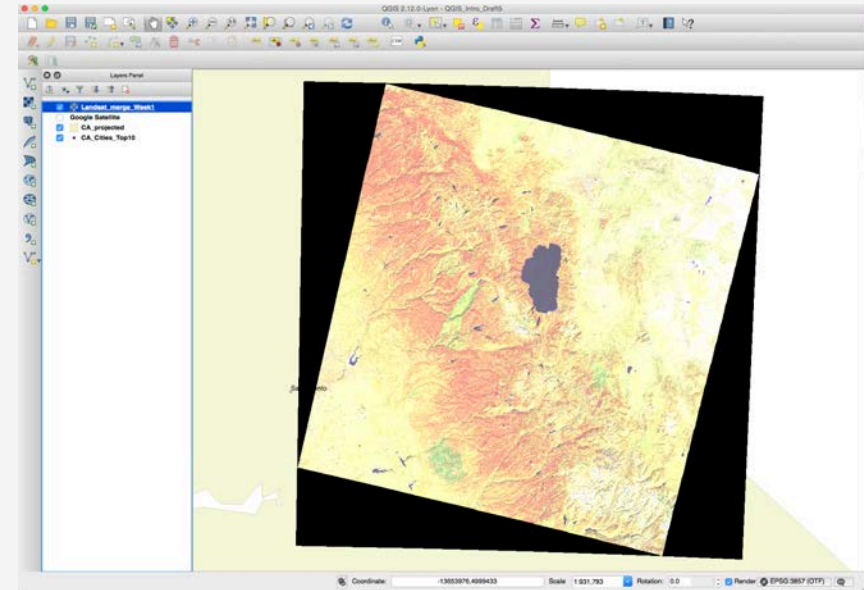
Week 4

MODIS NDVI Anomaly Mapping



Week 2 Agenda

- Review of Landsat Bands
- Acquiring Landsat Images
- In-class exercise: Deriving NDVI from Landsat using QGIS
- Q&A



Week 1 Review

- What is NDVI
- NDVI Applications and Examples
- NDVI Anomalies
- QGIS Introduction

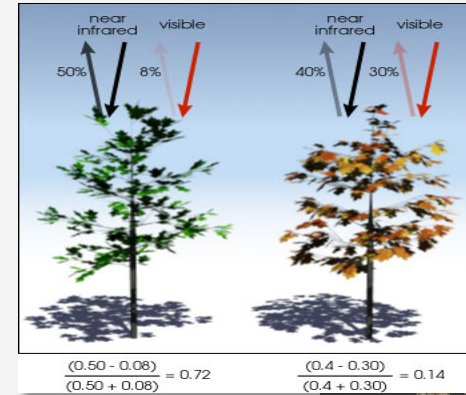
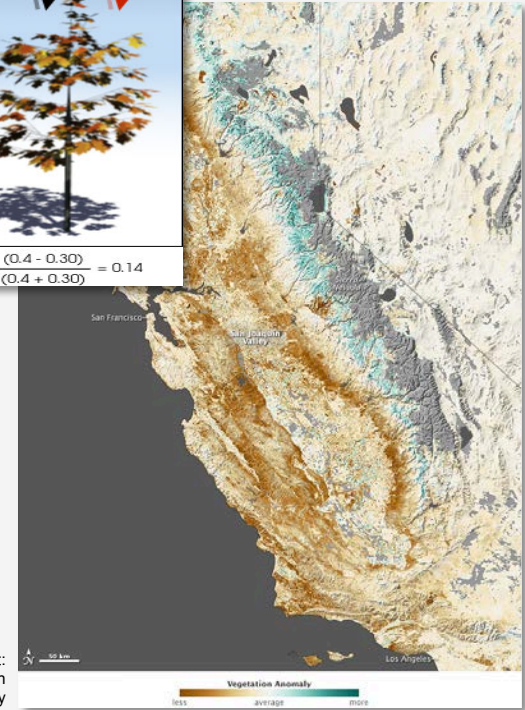


Image Credit: Robert Simmon



Image Credit:
NASA Earth
Observatory

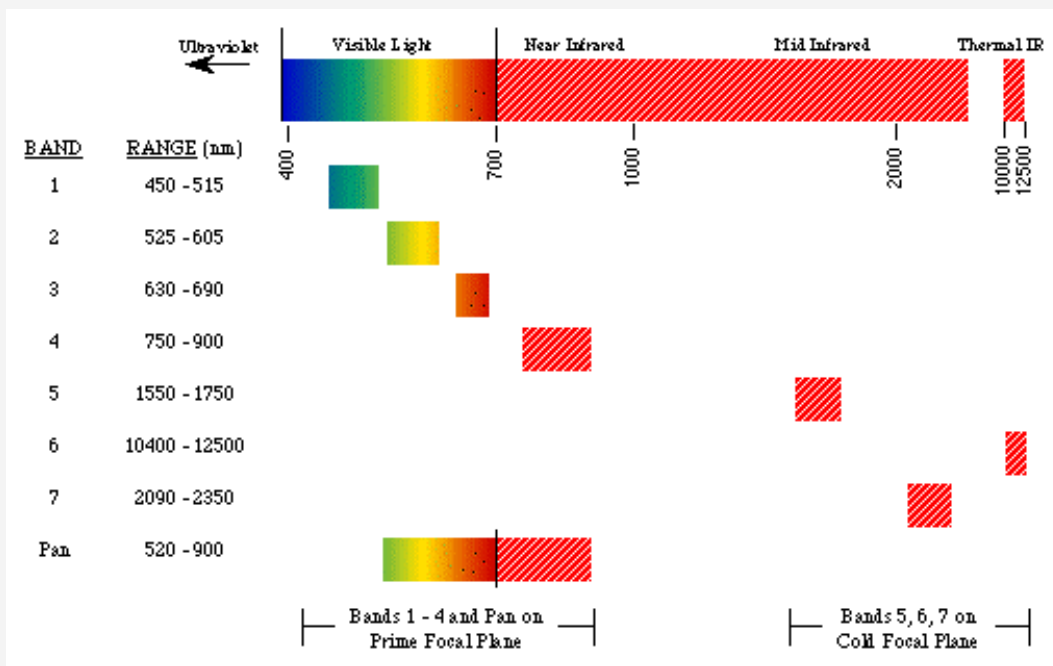


A satellite image of a river delta, likely the Amazon, showing a complex network of channels and floodplains. A semi-transparent rectangular box is overlaid on the center of the image, containing the text "Landsat Review".

Landsat Review

Spectral Characteristics of Landsat

- Landsat instruments measure primarily light that is reflected from Earth's surface (with one exception)
- Landsat instruments are designed to detect visible and infrared (near and mid) wavelengths.



Landsat bands of ETM+ (Landsat 7)

Characteristics of Landsat 4, 5, and 7

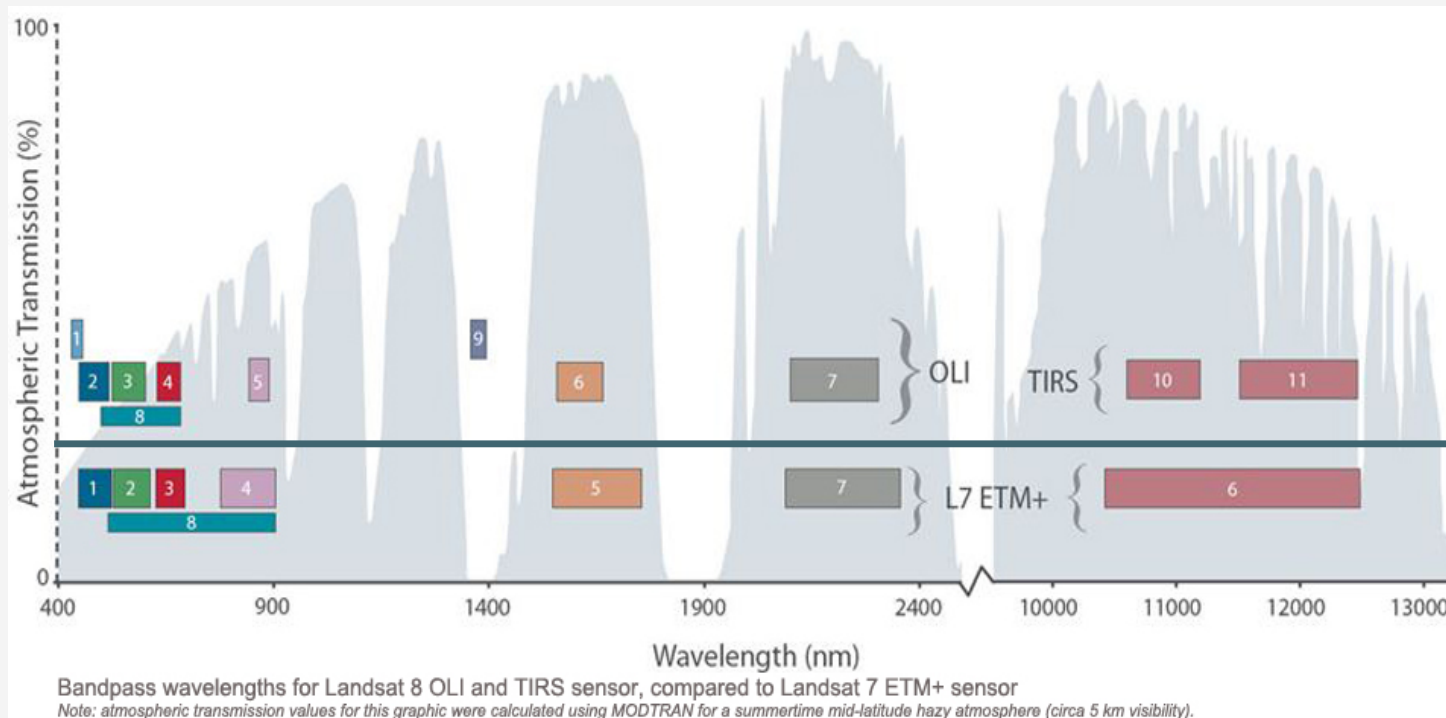
Bands	Wavelength (micrometers)	Resolution (m) Landsat 4-5 (TM)	Resolution (m) Landsat 7 (ETM+)
Band 1-Blue	0.45-0.52	30	30
Band 2 Green	0.52-0.60	30	30
Band 3- Red	0.63-0.69	30	30
Band 4-Near Infrared	0.76-0.90	30	30
Band 5- Shortwave Infrared 1	1.55-1.75	30	30
Band 6- Thermal Infrared	10.40-12.50	120	60
Band 7- Shortwave Infrared 2	2.08-2.35	30	30
Band 8-Pan	0.52-0.90	--	15

Characteristics of Landsat 8

Bands	Wavelength (micrometers)	Spatial Resolution (meters)
Band 1-Coastal aerosol	0.43-0.45	30
Band 2- Blue	0.45-0.51	30
Band 3- Green	0.53-0.59	30
Band 4- Red	0.64-0.67	30
Band 5- Near Infrared	0.85-0.88	30
Band 6- SWIR 1	1.57-1.65	30
Band 7- SWIR 2	2.11-2.29	30
Band 8-Panchromatic	0.50-0.68	15
Band 9-Cirrus	1.36-1.38	30
Band 10- Thermal Infrared 1	10.60-11.19	100*
Band 11- Thermal Infrared 2	11.50-12.51	100*

* Resampled to
30 meters

Landsat 7 vs. Landsat 8



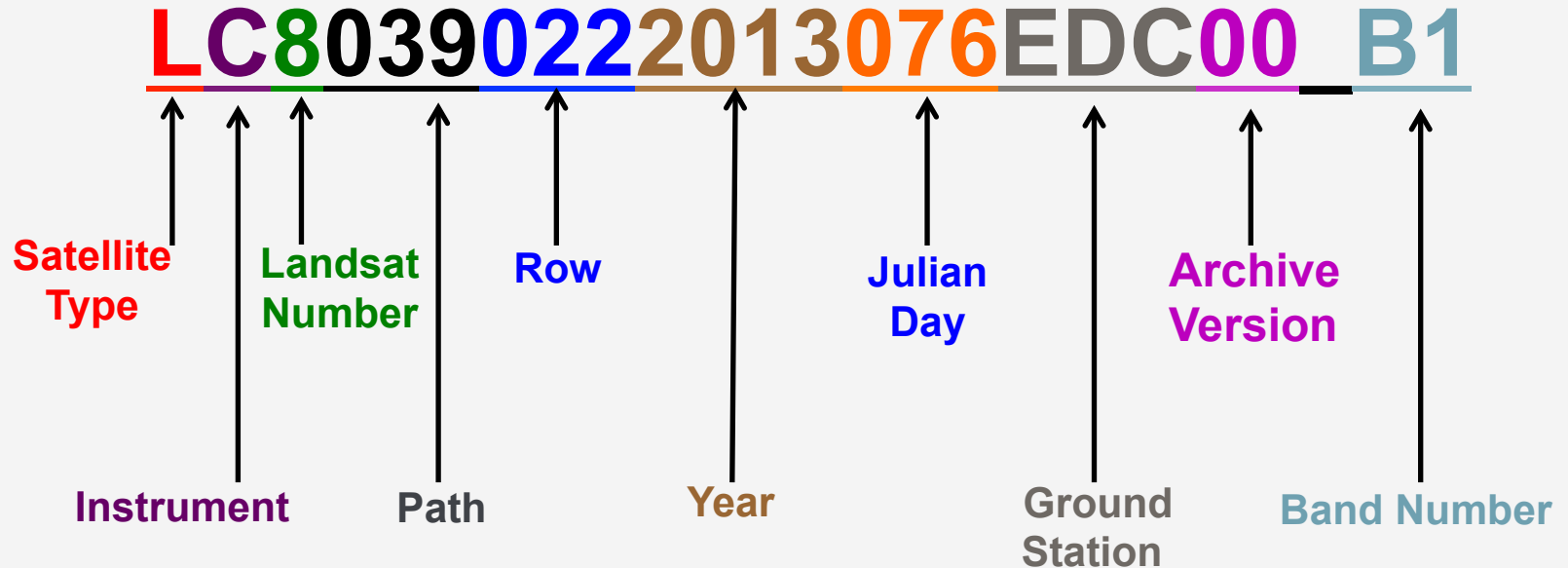
Landsat 8
Top

Landsat 7
Bottom

Landsat Bands for NDVI

Wavelengths	Landsat 8 Bands	Landsat 4,5, 7 Bands
Coastal aerosol	Band 1	
Blue	Band 2	Band 1
Green	Band 3	Band 2
Red	Band 4	Band 3
Near- Infrared	Band 5	Band 4
SWIR 1	Band 6	Band 5
SWIR 2	Band 7	Band 7
Panchromatic	Band 8	Band 8 (L7)
Cirrus	Band 9	
Thermal Infrared 1	Band 10	Band 6
Thermal Infrared 2	Band 11	

Landsat Naming Convention



*Instrument can be C: Combined, OLI: Operational Land Imager, or TIS: Thermal Infrared System

Where to Obtain Landsat Images

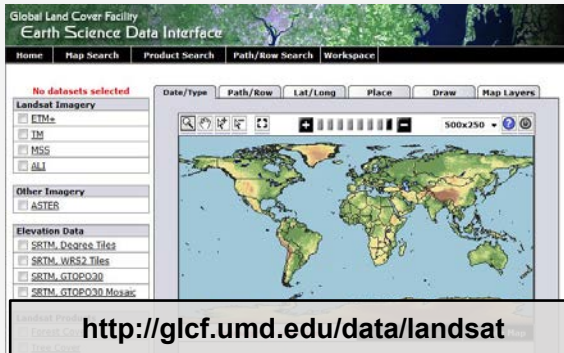
The LandsatLook Viewer



GloVis



Global Land Cover Facility

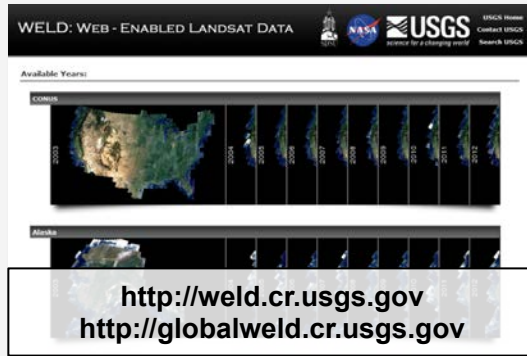


Earth Explorer

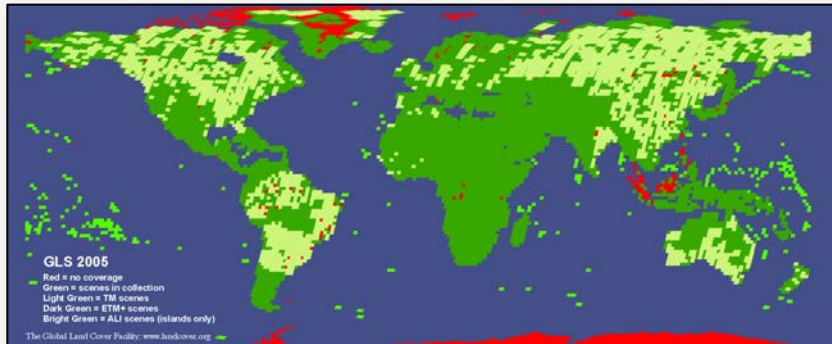
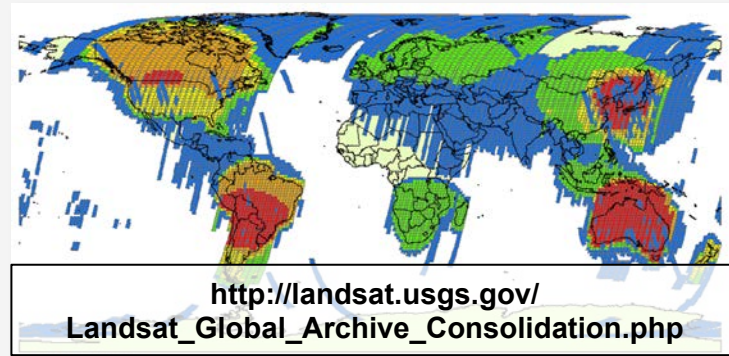


Where to Obtain Landsat Images

WELD



Landsat Global Archive Consolidation (USGS)



Global Land Survey

- Not a data portal, but a global collection of cloud free Landsat images from 1975-2008.
- Time series include (GLS 1975, GLS 1990, GLS 2000, GLS 2005, GLS 2010)
- Acquire GLS datasets through Earth Explorer, GloVis, and GLCF

The background is a satellite image of a river valley. A semi-transparent rectangular box is centered over the image, containing the title text. The text is in a large, black, sans-serif font. Below the text, a solid black horizontal line spans the width of the text box. The satellite image shows a winding river, green fields, and some urban areas.

Exercise: Calculating NDVI Using Landsat Imagery

Contacts

- ARSET Land Management and Wildfire Contacts
 - Cynthia Schmidt: Cynthia.L.Schmidt@nasa.gov
 - Amber McCullum: AmberJean.Mccullum@nasa.gov
- General ARSET Inquiries
 - Ana Prados: aprados@umbc.edu
- ARSET Website:
 - <http://arset.gsfc.nasa.gov/>



National Aeronautics and
Space Administration



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Thank You

Next Week:

MODIS NDVI Time Series